WHAT IS CLAIMED IS:

1. A method of using a population of fluorescent sensor molecules to measure the concentration of a polyhydroxylate analyte (A) in a solution, wherein the population of fluorescent sensor molecules are present in species that are not bound to the polyhydroxylate analyte (FS) and species that are bound to the polyhydroxylate analyte (AFS), the method comprising:

(a) determining the total fluorescence of the solution;

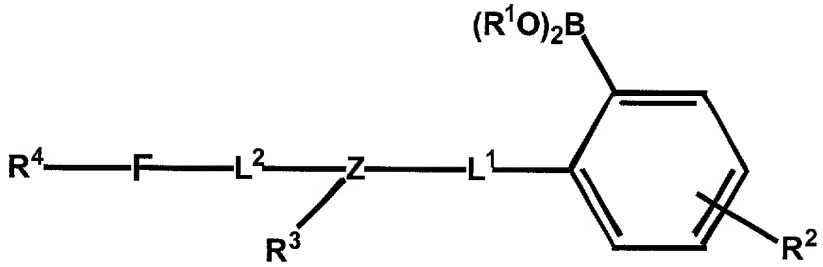
(b) determining the relative fluorescence contribution that the FS species and the AFS species make to the total fluorescence of the solution;

(c) using the relative fluorescence contribution values of FS and AFS as determined in step (b) to calculate the relative abundances of FS and AFS in the solution; and

(d) correlating the relative abundances of FS and AFS in the solution as calculated in step (c) with the concentration of the polyhydroxylate analyte so that the concentration of the polyhydroxylate analyte in the solution is determined.

2. The method of claim 1, wherein the fluorescent sensor molecule comprises an arylboronic moiety.

3. The method of claim 2, wherein the arylboronic fluorescent sensor molecule comprise a compound of the formula:



wherein:

F is a fluorophore with selected molecular properties;

$R^1$is selected from the group consisting of hydrogen, lower aliphatic and aromatic functional groups;

R^2 and R^4 are optional functional groups selected from the group consisting of hydrogen, lower aliphatic and aromatic functional groups and groups that form covalent bonds to a biocompatible matrix;

L^1 and L^2 are optional linking groups having from zero to four atoms selected from the group consisting of nitrogen, carbon, oxygen, sulfur and phosphorous;

Z is a heteroatom selected from the group consisting of nitrogen, phosphorous, sulfur, and oxygen;

R^3 is an optional group selected from the group consisting of hydrogen, lower aliphatic and aromatic functional groups and groups that form covalent bonds to a biocompatible matrix; and

wherein F and Z are involved in a photo-induced electron transfer process that quenches the intrinsic fluorescence of F in the absence of the polyhydroxylate analyte.

4. The method of claim 1, wherein the relative fluorescent contribution of the AFS species and the AFSA species is determined by measuring the fluorescent lifetime of each species via a method selected from the group consisting of phase-modulation fluorometry and time-resolved fluorometry.

5. The method of claim 4, wherein the fluorescent lifetimes are calculated using phase-modulation fluorometry.

6. The method of claim 4, wherein the fluorescent lifetimes are calculated using time-resolved fluorometry.

7. The method of claim 2, wherein the fluorescent sensor molecules comprise an amine moiety with a pKa of less than about 7.4.

8. The method of claim 2, wherein the arylboronic fluorescent sensor molecules comprise an amine moiety with a pKa of about 2.0 to about 7.0.

9. The method of claim 2, wherein the relative contribution of the FS species to the total fluorescence corresponds to the population of arylboronic fluorescent sensor molecules undergoing photo-induced electron transfer.

10. The method of claim 2, wherein the arylboronic fluorescent sensor molecule has an excitation wavelength of greater than about 400 nm.

11. The method of claim 10, wherein the excitation wavelength is between about 400 nm and about 600 nm.

12. The method of claim 1, wherein the polyhydroxylate analyte is glucose.

13. The method of claim 2, wherein the arylboronic fluorescent sensor molecule comprises a COB fluorophore or derivatives thereof.

14. The method of claim 2, wherein the arylboronic fluorescent sensor molecule comprises a NIB fluorophore or derivatives thereof.

15. The method of claim 2, wherein the arylboronic fluorescent sensor molecule comprises a fluorophore comprising a transition-metal complex.

16. A method of optically sensing the presence of a polyhydroxylate analyte in a sample,

the method comprising:

(a) placing a fluorescent sensor molecule (FS) in contact with the sample, wherein the fluorescent sensor molecule reversibly binds to the polyhydroxylate analyte,

the fluorescent sensor molecule comprising a first fluorescence lifetime corresponding to the fluorescent sensor molecule bound to the polyhydroxylate analyte (FSA) and a second fluorescence lifetime corresponding to the fluorescent sensor molecule not bound to the polyhydroxylate analyte, and wherein the fluorescence lifetimes of FSA and FS contribute relatively to a detectable fluorescence lifetime for the sample;

(b) exposing a population of the fluorescent sensor molecules to the sample;

(b) exciting the fluorescent sensor molecules in the sample with radiation;

(c) detecting a resulting emission beam emanating from the fluorescent sensor molecules in the sample, wherein the emission beam varies with the concentration of the polyhydroxylate analyte; and

(e) correlating the resulting emission beam to the presence of the polyhydroxylate analyte in the sample, wherein the concentration of the polyhydroxylate in the sample is determined.

17. The method of claim 16, wherein the relative fluorescent contribution of the FSA species and the FS species is a function of a quantum yield for each species.

18. The method of claim 16, wherein the relative fluorescent contribution of the FS species and the FSA species is a function of a decay rate for each species.

19. The method of claim 16, wherein the relative contribution of FS and FSA to the total fluorescence approximately equals unity.

20. The method of claim 16, further comprising detecting the relative contribution of FS or FSA to the total fluorescence and calculating the relative contribution to the total fluorescence of the species that is not directly detected.

21. The method of claim 16, wherein the fluorescent sensor molecule comprises a COB

fluorophore or derivatives thereof.

22. The method of claim 16, wherein the fluorescent sensor molecule comprises a NIB fluorophore or derivatives thereof.

23. The method of claim 16, wherein the fluorescent sensor molecule comprises a fluorophore comprising a metal complex.

24. The method of claim 16, wherein the fluorescent sensor molecule has more than one fluorescence lifetime in the absence of the polyhydroxylate analyte.

25. The method of claim 16, wherein at least one lifetime of the fluorescent sensor molecule corresponds to a population of fluorescent sensor molecules undergoing photo-induced electron transfer.

26. The method of claim 25, wherein the photo-induced electron transfer is intramolecular.

27. The method of claim 16, wherein exciting the sample with radiation comprises illuminating the sample with one or more of the following optical light sources: an incandescent lamp, an electroluminescent light, a ion laser, a dye laser, an LED, or a laser diode.

28. The method of claim 27, wherein the optical light source is pulsed or modulated.

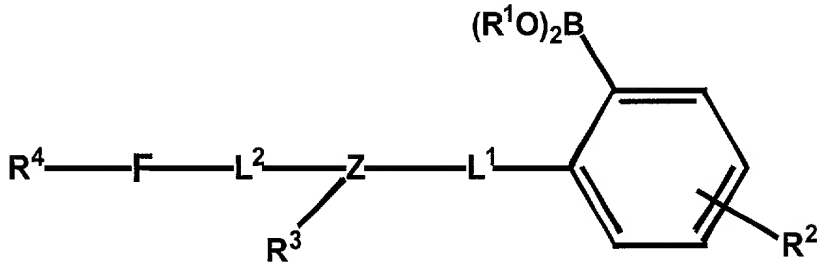
29. The method of claim 16, wherein the fluorescent lifetimes are calculated using phase-modulation fluorometry.

30. The method of claim 16, wherein the fluorescent lifetimes are calculated using time-resolved fluorometry.

31. The method of claim 16, wherein the fluorescent sensor molecules comprise a

arylboronic moiety which binds polyhydroxylate analyte.

32. The method of claim 16, wherein the fluorescent sensor molecule comprise a compound of the formula:



wherein:

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Z is a heteroatom selected from the group consisting of nitrogen, phosphorous, sulfur, and oxygen;

R^3 is an optional group selected from the group consisting of hydrogen, lower aliphatic and aromatic functional groups and groups that form covalent bonds to a biocompatible matrix; and

wherein F and Z are involved in a photo-induced electron transfer process that quenches the intrinsic fluorescence of F in the absence of the polyhydroxylate analyte.

33. The method of claim 32, wherein the polyhydroxylate analyte is glucose.

34 The method of claim 32, wherein Z comprises an amine with a pKa of less than about 7.4.

35. The method of claim 32, wherein Z comprises an amine with a pKa of about 2.0 to about 7.0.